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Brocade 7840 Extension Switch

Hardware Reference Manual

BROCADE

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Document conventions

The document conventions describe text formatting conventions, command syntax conventions, and important notice formats used in Brocade technical documentation.

Text formatting conventions

Text formatting conventions such as boldface, italic, or Courier font may be used in the flow of the text to highlight specific words or phrases.

Format	Description
bold text	Identifies command names
	Identifies keywords and operands
	Identifies the names of user-manipulated GUI elements
	Identifies text to enter at the GUI
<i>italic text</i>	Identifies emphasis
	Identifies variables and modifiers
	Identifies paths and Internet addresses
	Identifies document titles
<code>Courier font</code>	Identifies CLI output
	Identifies command syntax examples

Command syntax conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
bold text	Identifies command names, keywords, and command options.
<i>italic text</i>	Identifies a variable.

Convention	Description
value	In Fibre Channel products, a fixed value provided as input to a command option is printed in plain text, for example, --show WWN.
[]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{ x y z }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options. In Fibre Channel products, square brackets may be used instead for this purpose.
x y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member[member...]</i> .
\	Indicates a “soft” line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

Notes, cautions, and warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

NOTE

A Note provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

ATTENTION

An Attention statement indicates a stronger note, for example, to alert you when traffic might be interrupted or the device might reboot.



CAUTION

A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.



DANGER

A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Brocade resources

Visit the Brocade website to locate related documentation for your product and additional Brocade resources.

You can download additional publications supporting your product at www.brocade.com. Select the Brocade Products tab to locate your product, then click the Brocade product name or image to open the individual product page. The user manuals are available in the resources module at the bottom of the page under the Documentation category.

To get up-to-the-minute information on Brocade products and resources, go to [MyBrocade](#). You can register at no cost to obtain a user ID and password.

Release notes are available on [MyBrocade](#) under Product Downloads.

White papers, online demonstrations, and data sheets are available through the [Brocade website](#).

Contacting Brocade Technical Support

As a Brocade customer, you can contact Brocade Technical Support 24x7 online, by telephone, or by e-mail. Brocade OEM customers contact their OEM/Solutions provider.

Brocade customers

For product support information and the latest information on contacting the Technical Assistance Center, go to <http://www.brocade.com/services-support/index.html>.

If you have purchased Brocade product support directly from Brocade, use one of the following methods to contact the Brocade Technical Assistance Center 24x7.

Online	Telephone	E-mail
Preferred method of contact for non-urgent issues:	Required for Sev 1-Critical and Sev 2-High issues:	support@brocade.com
<ul style="list-style-type: none"> • My Cases through MyBrocade • Software downloads and licensing tools • Knowledge Base 	<ul style="list-style-type: none"> • Continental US: 1-800-752-8061 • Europe, Middle East, Africa, and Asia Pacific: +800-AT FIBREE (+800 28 34 27 33) • For areas unable to access toll free number: +1-408-333-6061 • Toll-free numbers are available in many countries. 	Please include: <ul style="list-style-type: none"> • Problem summary • Serial number • Installation details • Environment description

Brocade OEM customers

If you have purchased Brocade product support from a Brocade OEM/Solution Provider, contact your OEM/Solution Provider for all of your product support needs.

- OEM/Solution Providers are trained and certified by Brocade to support Brocade® products.
- Brocade provides backline support for issues that cannot be resolved by the OEM/Solution Provider.

- Brocade Supplemental Support augments your existing OEM support contract, providing direct access to Brocade expertise. For more information, contact Brocade or your OEM.
- For questions regarding service levels and response times, contact your OEM/Solution Provider.

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To send feedback and report errors in the documentation you can use the feedback form posted with the document or you can e-mail the documentation team.

Quality is our first concern at Brocade and we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. You can provide feedback in two ways:

- Through the online feedback form in the HTML documents posted on www.brocade.com.
- By sending your feedback to documentation@brocade.com.

Provide the publication title, part number, and as much detail as possible, including the topic heading and page number if applicable, as well as your suggestions for improvement.

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Supported software

This document includes information specific to the Brocade 7840 running Brocade Fabric version OS 7.3 and later.

What's new in this document

The following changes have been made since this document was last released:

- Added information about the SFPs included with the switch.
- Reorganized the table listing the weight specifications of the switch.

What's new in this document

Introducing the Brocade 7840 Extension Switch

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Overview of Brocade 7840 Extension Switch

The Brocade 7840 Extension Switch is intended as a platform for Fibre Channel over IP (FCIP). This enables transmission of Fibre Channel data over long distances by way of IP networks by wrapping Fibre Channel frames in IP packets. Each end of the FCIP communication path must be a compatible FCIP device.

The switch can operate independently or in a fabric containing multiple extension switches.

Brocade 7840 software features

The Brocade 7840 provides the following software features:

- Multiple logical FCIP tunnels with maximum tunnel bandwidth up to 20Gbps allow for scalable connectivity between sites. Note that the 7840 does not support FCIP connectivity with any other products including the Brocade 7800 and FX8-24.
- FCIP Trunking feature allows multiple IP source and destination address pairs (defined as FCIP circuits) via multiple 1/10GbE or 40GbE interfaces to provide high bandwidth FCIP tunnel and lossless failover resiliency. In addition, each FCIP circuit supports four QoS classes (Class-F, High, Medium and Low Priority), each as a TCP connection.
- ARL feature meets minimum bandwidth guarantee for each tunnel while making the full utilization of the available network bandwidth without adverse throughput performance impact at high traffic load.
- Hardware-based compression delivers the ability to maximize throughput over lower bandwidth links in the wide area network, optimizing the cost efficiencies of FCIP. The 7840 compresses FC frames before they are encapsulated into FCIP packets.
- Key protocol features are enabled in the FCIP implementation to optimize performance of Extension over IP networks, including FX8-24 and WAN Optimized TCP (WO-TCP), 9K jumbo frame and end-to-end Path MTU auto discovery.
- Hardware-based IPsec supports mix of secure and non-secure tunnels on the same Ethernet port, jumbo frames, and VLAN tagged connections. The Brocade 7840 IPsec function is capable of supporting both IPv4 and IPv6.
- FastWrite, Open Systems Tape Pipelining and Advanced Accelerator for FICON mitigate the latency effect of a long distance FCIP distance connection over IP WAN.
- FCIP HCL (Hot Code Load) provides In-service firmware upgrade for supporting 24/7 non-stop business operations
- Built-in WAN link tester generates traffic over an IP connection to test for maximum throughput, congestion, loss percentage, out of order deliver, latency, and other network conditions. It helps determine the health of a WAN link before deploying it for use.
- Fabric Vision advanced monitoring provides the following functions:

- Policy based monitoring monitors FCIP connectivity and WAN anomalies using multi-layer metrics.
- Flow monitoring reports IOPS and data rate of individual I/O flows of inter-DC replication and tape backup operations.
- Flow generator generates FC frames for a defined flow with default or custom size and pattern and sent across FCIP tunnel to help validate end to end network setup and configuration.
- Brocade Fabric OS delivers distributed intelligence throughout the network and enables a wide range of value-added applications.

Brocade 7840 hardware features

The Brocade 7840 provides the following hardware features:

- 24 Fibre Channel ports with link speeds of 2, 4, 8, and 16 Gbps, compatible with short wavelength (SWL), long wavelength (LWL) and extended long wavelength (ELWL) SFP+ transceivers
- Rack-mountable 2U chassis
- Sixteen 1 GbE/10 GbE ports, compatible with copper, ultra short reach (USR), short reach (SR) and long reach (LR) SFP/SFP+ transceivers
- Two 40 GbE ports, compatible with short reach (SR) and long reach (LR) QSFP transceivers
- One RJ-45 Ethernet management port with 10/100/1000 Mbps autonegotiating capability
- One USB port that provides storage for firmware updates, output of the **supportSave** command, and storage for configuration uploads and downloads
- Two redundant, hot-swappable 1100 W AC/DC power supply units (PSUs) with integral fans
- 3 port-side exhaust DC fan FRUs

NOTE

QSFPs used in the FC16-64 blades (and 8510 core blades) are not compatible with the Brocade 7840.

Brocade 7840 feature licensing

The Brocade 7840 provides the following licensing features:

- Tiered WAN throughput licensing provides coverage of multiple customer segments with one physical platform:

NOTE

The application throughput numbers shown in the following table assume that some degree of data compression is occurring. However, Brocade makes no promises, guarantees, or any indication that some level of compression is possible for customer-specific data. Some data is highly compressible and some data cannot be compressed. The amount of application throughput varies depending on data compressibility and the selected compression mode.

Product configuration	FC Ports	Ethernet Ports	WAN rate limiting	Approximate Application throughput
Base configuration	24 16G	16 1/10GbE	5 Gbps	15 Gbps (see note above)

Medium configuration (Base + WAN Rate Upgrade 1)	24 16G	16 1/10GbE	10 Gbps	30 Gbps (see note above)
Max configuration (Base + WAN Rate Upgrade 1 and WAN Rate Upgrade 2)	24 16G	16 1/10GbE + 2 40GbE	Unlimited	80 Gbps (see note above)

- Two base unit SKUs:
 - One SKU with SWL SFPs (Enterprise Bundle and Advanced Extension are included)
 - One SKU with LWL SFPs (Enterprise Bundle and Advanced Extension are included)
- Streamlined feature licensing:
 - The Brocade 7840 uses common licenses with other midrange products (e.g. Brocade 6510) for IR and CUP.
 - A new SKU for Advanced Acceleration for FICON license on the Brocade 7840 is introduced.
- All ports and interfaces on the switch are active except for the 40GE interfaces. The 40GE interfaces are enabled as part of WAN Rate Upgrade 2.

Available licenses

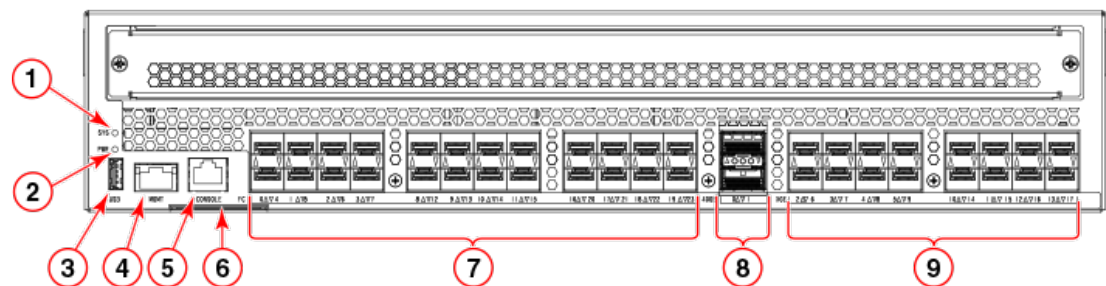
The following features are available with the purchase of a specific license key for the Brocade 7840:

- Integrated Routing (IR)
- Advanced Acceleration for FICON
- FICON CUP
- WAN Rate Upgrade 1
- WAN Rate Upgrade 2

For information on these features, refer to the *Fabric OS Administrator's Guide*.

Port side of the switch

The following figures show the port side of the switch.

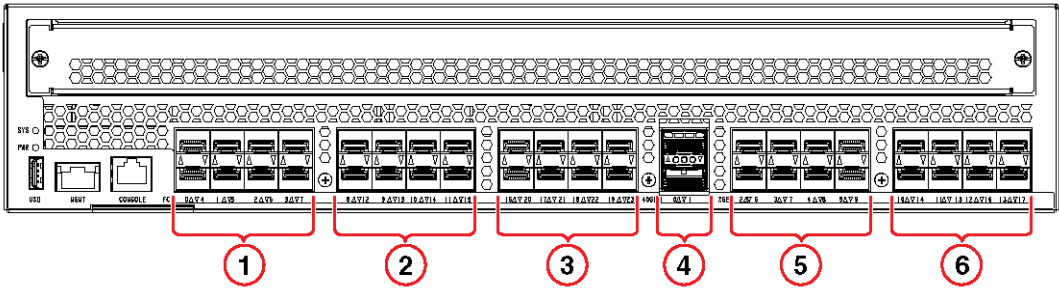


- | | |
|---------------------|------------------------------|
| 1 System Status LED | 4 Ethernet Management port |
| 2 Power Status LED | 5 Console port (RJ-45) |
| 3 USB port | 6 Serial number pull-out tab |

- | | | | |
|---|----------------------|---|------------------------------|
| 7 | 16 GbE FC ports (24) | 8 | 40 GbE FCIP ports (QSFP) (2) |
| | | 9 | 1/10 GbE FCIP ports (16) |

FIGURE 1 Port side view of the Brocade 7840 Extension Switch

The Fibre Channel ports are numbered from left to right on the faceplate, as shown in the following figure.



- | | | | |
|---|---------------------------------|---|-------------------------------------|
| 1 | FC ports (16 GbE) 0 through 7 | 4 | FCIP ports (40 GbE) 0 and 1 (QSFP) |
| 2 | FC ports (16 GbE) 8 through 15 | 5 | FCIP ports (1/10 GbE) 2 through 9 |
| 3 | FC ports (16 GbE) 16 through 23 | 6 | FCIP ports (1/10 GbE) 10 through 17 |

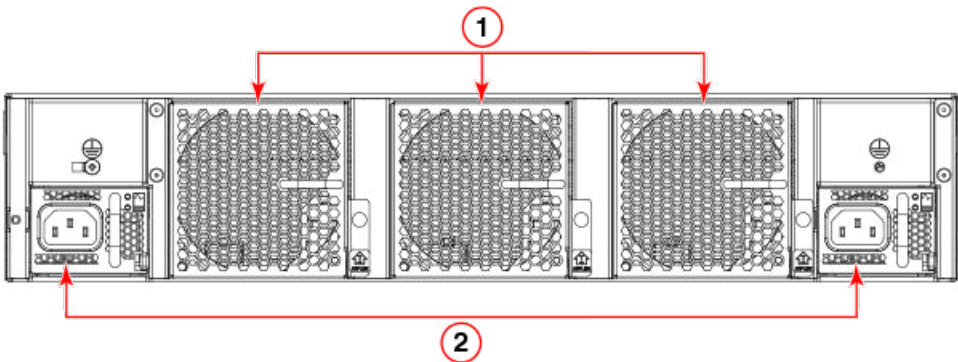
FIGURE 2 Port numbering in the switch

You can have two Brocade Trunk groups on a fully licensed switch. Group 1 would consist of FC ports 0 through 7 and group 2 would be ports 8 through 15.

Nonport side of the switch

The following figure shows the nonport side of the switch, which contains two power supply FRUs and three fan FRUs.

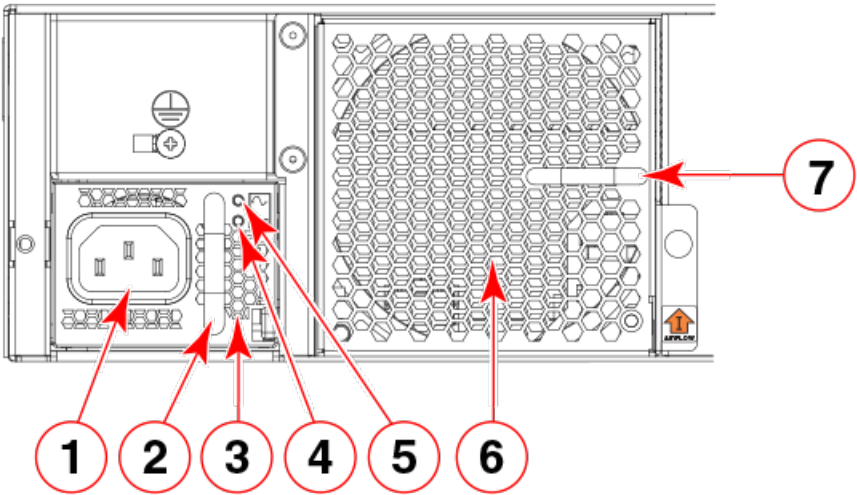
FIGURE 3 Nonport side of the switch



- | | |
|------------|--|
| 1 Fan FRUs | 2 Power supply FRUs with integral fans |
|------------|--|

The following figure shows more details about the power supply and fan FRUs.

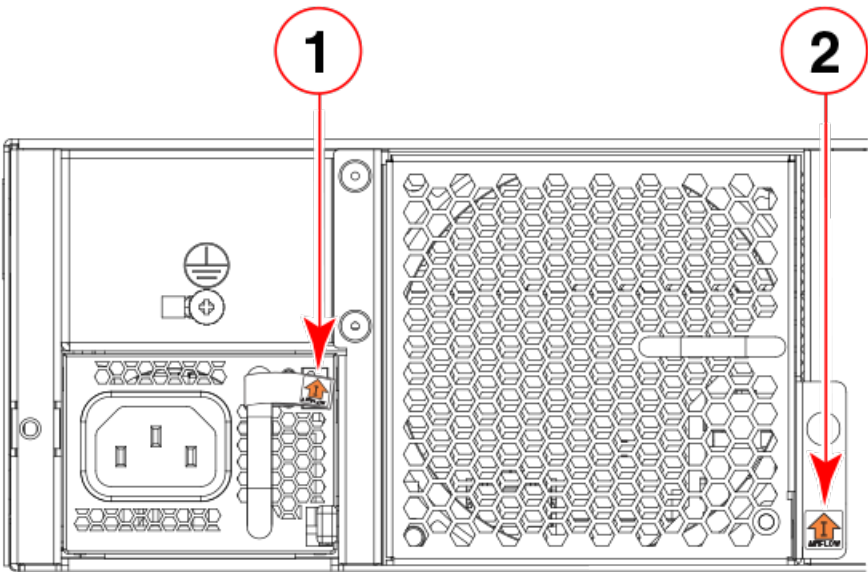
FIGURE 4 Power supply and fan details



1 AC power socket	5 AC status LED
2 Handle	6 Fan air inlet
3 Integral fan air inlet	7 Handle
4 DC status LED	

The following figure shows the airflow labels on the power supply and fan FRUs.

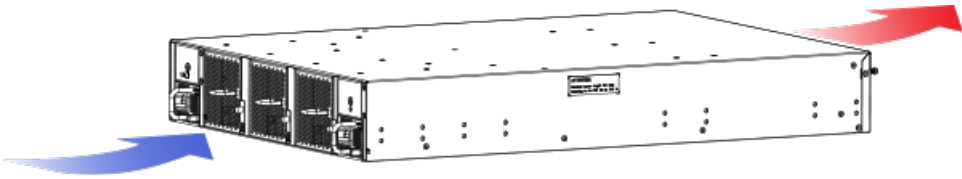
FIGURE 5 Power supply and fan airflow labels



1 Airflow label for PSU integral fan	2 Airflow label for fan FRU
--------------------------------------	-----------------------------

The following figure shows the fan airflow (Intake only) for the Brocade 7840. Exhaust airflow is not supported in this release.

FIGURE 6 Fan airflow



Switch management

You can use the management functions built into the switch to monitor the fabric topology, port status, physical status, and other information to help you analyze switch performance and to accelerate system debugging.

For information about upgrading the version of Fabric OS installed on your switch, refer to the *Fabric OS Administrator's Guide*

You can manage the switch using any of the management options listed in the following table.

TABLE 1 Management options for the Brocade 7840

Management tool	Out-of-band support	In-band support
Command line interface (CLI) Up to two admin sessions and four user sessions simultaneously. For more information, refer to the <i>Fabric OS Administrator's Guide</i> and the <i>Fabric OS Command Reference</i> .	Ethernet (preferred) or console port connection	IP over Fibre Channel
Brocade Network Advisor	Ethernet (preferred) or console port connection	IP over Fibre Channel
Brocade Web Tools For information, refer to the <i>Web Tools Administrator's Guide</i> .	Ethernet (preferred) or console port connection	IP over Fibre Channel
Standard SNMP applications You can download the Brocade-specific MIB files from the downloads area of the MyBrocade site under the applicable Fabric Operating System (FOS) release. For information about SNMP support in Fabric OS and how to use MIBs, refer to the <i>Fabric OS Administrator's Guide</i> . For release-specific SNMP enhancements, refer to the release notes.	Ethernet (preferred) or console port connection	IP over Fibre Channel
NOTE Distribution of standard MIBs has been stopped. Download the required standard MIBs from the www.oidview.com or www.mibdepot.com web sites.		

TABLE 1 Management options for the Brocade 7840 (Continued)

Management tool	Out-of-band support	In-band support
Management Server For information, refer to the <i>Fabric OS Administrator's Guide</i> and the <i>Fabric OS Command Reference</i> .	Ethernet (preferred) or console port connection	Native in-band interface (over HBA only)

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Installation and safety considerations

You can install the switch in the following ways:

- As a standalone unit on a flat surface.
- In an EIA rack using the Universal Two-Post Rack Kit or Universal Four-Post Rack Kit.

To install and operate the switch successfully, ensure that the following requirements are met:

- The primary AC input is 100-240 VAC (Brocade 7840 autosenses input voltage), 50-60 Hz. 200-240 VAC is recommended.
- The primary outlet is correctly wired, protected by a circuit breaker, and grounded in accordance with local electrical codes. It is best practice that each power supply obtain its power from a different protected and wired source. It is best practice that each power supply obtain its power from a different protected and wired source.
- The supply circuit, line fusing, and wire size are adequate, as specified by the electrical rating on the Brocade 7840 nameplate.

For power supply information, refer to [Power supplies and fans](#) on page 37.

To ensure adequate cooling, install the Brocade 7840 with the nonport side, which contains the air intake vents, facing a cool-air aisle.



CAUTION

Make sure the airflow around the front, sides, and back of the device is not restricted.

Verify that the ambient air temperature does not exceed 40°C (104°F) and that the ambient humidity remains between 20 and 85 percent while the Brocade 7840 is operating.



CAUTION

Do not install the device in an environment where the operating ambient temperature might exceed 40°C (104°F).

If installing the Brocade 7840 in a rack:

- The rack must be a standard EIA rack.
- Plan for a rack space that is 2U (8.89 cm; 3.5 in.), (19 in.) 48.3 cm wide, and at least 61cm (24 in.) deep.
- Ground all equipment in the rack through a reliable branch circuit connection and maintain ground at all times. Do not rely on a secondary connection to a branch circuit, such as a power strip.

- Ensure that airflow and temperature requirements are met on an ongoing basis.
- Verify that the additional weight of the Brocade 7840 does not exceed the rack's weight limits or unbalance the rack in any way.



DANGER

Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

Installation Precautions

Review all installation precautions before installing the device.

General precautions



DANGER

The procedures in this manual are for qualified service personnel.



CAUTION

Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



DANGER

All fiber-optic interfaces use Class 1 lasers.

Power Precautions

This Extension Switch might have more than one power cord. To reduce the risk of electric shock, disconnect both power cords before servicing.



DANGER

Remove both power cords before servicing.



DANGER

Disconnect the power cord from all power sources to completely remove power from the device.



CAUTION

Before plugging a cable into to any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

Connect the power cord only to a grounded outlet.



DANGER

Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

This product is designed for an IT power system with phase-to-phase voltage of 230V. After operation of the protective device, the equipment is still under voltage if it is connected to an IT power system.

Items included with the switch

The following items are included with the standard shipment of the Brocade 7840:

- The Brocade 7840, containing two combined power supply FRUs with integral fans
- Three individual fan FRUs
- The following rack mount kits are available options:
 - Fixed rack mount kit, with installation instructions
 - Mid-mount kit, with installation instructions
- All Fibre Channel ports contain 16 Gbps SWL or LWL SFP transceivers
- One accessory kit, containing the following items:
 - *Brocade 7840 QuickStart Guide*
 - EZSwitchSetup CD Kit
 - China-ROHS Hazardous/Toxic Substance Content Chart
 - Documentation reference card (describes where to find relevant documentation)
 - 24 16 G Brocade branded SWL or LWL SFPs, depending on the switch SKU ordered
 - Network Advisor download insert
 - Rubber mounting feet (to be used when setting up the Extension Switch as a standalone unit)
 - Two grounded 6-ft. (approximately 1.83 m) power cords:
 - Power plug type: NEMA5-15
 - Power plug current/voltage rating: 15A/125V
 - Cordage type: SJT
 - Current rating/wire gauge: 13A/16AWG with a 105°C (221°F) temperature rating
 - Connector at system end of cordset: IEC 60320/C13
 - Two power cord retainers
 - One RJ-45 serial cable (10 ft. or approximately 3 m.). The Extension Switch uses an RJ-45 connector for the console port. An RJ-45 to DB-9 adapter is also provided with the switch.

Setting up the Brocade 7840 as a standalone unit

The Brocade 7840 can be configured as a standalone unit, which means that it resides outside of a rack. Perform the following steps to configure the Brocade 7840 as a standalone unit.

1. Unpack the Brocade 7840 and verify that all ordered items are present.
2. Clean the four corner depressions on the bottom of the Brocade 7840 and place a rubber foot in each one. This helps prevent the Brocade 7840 from accidentally sliding off the supporting surface.
3. Place the Brocade 7840 on a stable, flat surface.

Installing in an EIA rack

The Brocade 7840 can be installed in an EIA rack using one of the following optionally available rack-mount kits. Refer to the documentation that is shipped with the rack-mount kit for installation instructions:

- *Universal Four-Post Rack Kit Installation Procedure Supporting Brocade 7840 Extension Switch*
- *Universal Two-Post Rack Kit Installation Procedure Supporting the Brocade VDX 6740T and Brocade 7840 Extension Switch.*

Initial setup of the switch

The switch must be configured correctly before it can operate within a network and fabric. For instructions on configuring the switch to operate in a fabric containing Extension Switches from other vendors, refer to the *Fabric OS Administrator's Guide*.

If you are going to use the switch in a single-switch setup, you can use EZSwitchSetup to complete the basic configuration.

Refer to the EZSwitchSetup CD, included with the switch for more information.

If you do not want to use EZSwitchSetup, refer to the following steps.

The following items are required for configuring and connecting the switch for use in a network and fabric:

- The switch, installed and connected to a power source
- A workstation computer that has a terminal emulator application (such as HyperTerminal for Windows)
- An unused IP address and corresponding subnet mask and gateway address
- The serial cable provided with the switch
- An Ethernet cable
- SFP transceivers and compatible fiber and copper cables, as required
- Access to an FTP server, for backing up (uploading) or downloading the switch configuration

To configure the switch, you must perform the following tasks:

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NOTE

Do not connect the switch to the network until the IP address is correctly set.

Providing power to the switch

Perform the following steps to provide power to the switch.

1. Connect the power cords to both power supplies and then to power sources on separate circuits to protect against AC failure. Ensure that the cords have a minimum service loop of 6 in. available and are routed to avoid stress.
Connecting a power cord turns the switch on. The power supply has two LEDs, one for AC status and one for DC status. Both LEDs go green within a second of power being applied. The Power Status LED on the portside turns green as soon as either power supply LED is green. The status LED is amber only until FOS is loaded and then it turns green. The status LED is green while POST is running.
2. After POST is complete, verify that the Brocade 7840 power and status LEDs of the switch are green.

Connecting to the switch using the serial connection

Perform the following steps to log in to the switch through the serial connection.

1. Verify that the switch has completed POST. When POST is complete, the port status and switch power and status LEDs return to a standard healthy state.
2. Connect the serial cable to the serial port on the switch and to an RS-232 serial port on the workstation.

If the serial port on the workstation is RJ-45 instead of RS-232, remove the adapter on the end of the serial cable and insert the exposed RJ-45 connector into the RJ-45 serial port on the workstation.

3. When the terminal emulator application stops reporting information, press **Enter** to display the login prompt.
4. Log in to the switch as **admin**, using the default password: **password**. You are prompted to change the default passwords at initial login.
5. Configure the application as follows:

- In a Windows environment:

Parameter	Value
Bits per second	9600
Databits	8
Parity	None
Stop bits	1
Flow control	None

- In a UNIX environment using TIP, enter the following string at the prompt:

```
tip /dev/ttyb -9600.
```

If ttyb is already in use, use ttya instead and enter the following string at the prompt:

```
tip /dev/ttya -9600
```

Setting the switch IP address

You can configure the switch with a static IP address, or you can use a Dynamic Host Configuration Protocol (DHCP) server to set the IP address of the switch. DHCP is enabled by default. The switch supports both IPv4 and IPv6.

Using DHCP to set the IP address

When using DHCP, the switch obtains its IP address, subnet mask, and default gateway address from the DHCP server. The DHCP client can only connect to a DHCP server that is on the same subnet as the switch. If your DHCP server is not on the same subnet as the switch, use a static IP address.

Setting a static IP address

1. Log in to the switch using the default password, which is password.
2. Use the **ipaddrset** command to set the Ethernet IP address.

If you are going to use an IPv4 IP address, enter the IP address in dotted decimal notation as prompted.

```
Ethernet IP Address: [192.168.74.102]
```

If you are going to use an IPv6 address, enter the network information in colon-separated notation as prompted.

```
switch:admin> ipaddrset -ipv6 --add 1080::8:800:200C:417A/64  
IP address is being changed...Done.
```

3. Complete the rest of the network information as prompted. (IPv4 format shown):

```
Ethernet Subnetmask: [255.255.255.0]  
Ethernet IP Address: [192.168.74.102]  
Gateway IP Address: [192.168.74.1]
```

4. Enter **off** to disable DHCP when prompted.

```
DHCP [OFF]: off
```

Changing the switch name and chassis name

Changing the switch and chassis names are important for accurate tracking of errors in the RASlog. The messages that appear in the log will be labeled with the switch or chassis name, which makes tracking the errors much easier. Choose an easily understandable and meaningful name for the switch and chassis names.

Perform the following steps to change the chassis name and then the switch name.

1. Log in to the switch through Telnet using the admin account.
2. Change the chassis name by using the **chassisName** command.

```
switch:admin> chassisname my7840chassis
```

3. Change the switch name by using the **switchName** command.

```
switch:admin> switchname my7840switch
```

Creating an Ethernet connection

Perform the following steps to create an Ethernet connection to the switch.

1. Remove the plug from the Ethernet port.
2. Connect an Ethernet cable to the switch Ethernet port and to the workstation or to an Ethernet network containing the workstation.

NOTE

At this point, the switch can be accessed remotely, by command line or by Web Tools. Ensure that the switch is not being modified from any other connections during the remaining tasks. The Ethernet management port also supports AutoMDI/MDIX.

Setting the domain ID of the switch

Perform the following steps to set the switch domain ID.

1. Log in to the switch through Telnet using the admin account.
2. Modify the domain ID if required.

The default domain ID is 1. If the switch is not powered on until after it is connected to the fabric and the default domain ID is already in use, the domain ID for the new switch is automatically reset to a unique value. If the switch is connected to the fabric after it has been powered on and the default domain ID is already in use, the fabric segments. To find the domain IDs that are currently in use, enter the **fabricShow** command on another Extension Switch in the fabric.

Perform the following steps to modify the Domain ID.

- a) Disable the switch by entering the **switchDisable** command.
- b) Enter the **configure** command. The command prompts display sequentially; enter a new value or press **Enter** to accept each default value.
- c) Enter **y** after the "Fabric param" prompt.

Fabric param (yes, y, no, n): [no] y
- d) Enter a unique domain ID (such as the domain ID used by the previous Extension Switch, if still available).

Domain: (1..239) [1] 3
- e) Complete the remaining prompts or press Ctrl+D to accept the remaining settings without completing all the prompts.
- f) Re-enable the switch by entering the **switchEnable** command.

Setting the date and time of the switch

The date and time switch settings are used for logging events. Switch operation does not depend on the date and time; a switch with incorrect date or time values still functions properly.

You can synchronize the local time of the principal or primary fabric configuration server (FCS) switch to that of an external Network Time Protocol (NTP) server.

Perform the following steps to set the date and time of a switch.

1. Log in to the switch as admin.
2. Enter the **date** command at the command line using the following syntax:

```
date ["newdate"]
```

This command has the following operand:

"newdate"

This operand specifies the new date and time enclosed in double quotation marks. this operand is optional; if omitted, the current date and time is displayed. Date and time are specified as a string in the *mmddhhmmyy* format.

- *mm*: Specifies the month. Valid values are 01 to 12.
- *dd*: Specifies the date. Valid values are 01 to 31.
- *hh*: Specifies the hour. Valid values are 00 to 23.
- *mm*: Specifies the minutes. Valid values are 00 to 59.
- *yy*: Specifies the year, valid values are 00 to 37 and 70 to 99. Year values from 70 to 99 are interpreted as 1970 to 1999; year values from 00 to 37 are interpreted as 2000 to 2037.

```
switch:admin> date
Tue Oct 22 14:05:10 UTC 2013
switch:admin> date "1022140613"
Tue Oct 22 14:06:00 UTC 2013
```

Synchronizing local time with an external source

Perform the following steps to synchronize the local time of the principal or primary FCS switch with that of an external NTP server.

1. Log in as admin.
2. Enter the **tsClockServer** *ipaddr* command.

The *ipaddr* variable represents the IP address of the NTP server that the switch can access. This argument is optional; by default, the value is "LOCL".

```
sw7840:admin> tsclockserver 192.168.126.60
Updating Clock Server configuration...done.
Updated with the NTP servers
```

Correcting the time zone of a switch

If the time of your switch is off by hours (and not minutes), use the following procedure to set the time zone.

1. Log in as admin.
2. You can use the **tstimezone --interactive** command and follow the prompts or enter the **tsTimeZone** command as follows:

```
tstimezone [houroffset [, minuteoffset]]
```

For Pacific Standard Time, enter **tsTimeZone -8,0**

For Central Standard Time, enter **tsTimeZone -6,0**

For Eastern Standard Time, enter **tsTimeZone -5,0**

The default time zone for switches is universal time conversion (UTC), which is 8 hours ahead of Pacific Standard Time. Additional time zone conversions are listed in the table below.

The parameters listed do not apply if the time zone of the switches has already been changed from the default (8 hours ahead of Pacific Standard Time).

For more information about the command parameters, refer to the **tsTimeZone** command in the *Fabric OS Command Reference*.

Setting the time zone needs to be done only once, because the value is stored in nonvolatile memory. For U.S. time zones, use the following table to determine the correct parameter for the **tsTimeZone** command.

TABLE 2 tsTimeZone command parameter selection

Local time	tsTimeZone parameter (difference from UTC)
Atlantic Standard	-4,0
Atlantic Daylight	-3,0
Eastern Standard	-5,0
Eastern Daylight	-4,0
Central Standard	-6,0
Central Daylight	-5,0
Mountain Standard	-7,0
Mountain Daylight	-6,0
Pacific Standard	-8,0
Pacific Daylight	-7,0
Alaskan Standard	-9,0
Alaskan Daylight	-8,0
Hawaiian Standard	-10,0

FCIP and Fibre Channel routing services configuration

The ports on the switch are initially set to persistently disabled.

If you want to enable the FC ports as a standard E_Port or F_Port, use the **portcfgpersistentenable** command to enable the ports.

If you are using the FC ports as EX_Ports, you must configure the Fibre Channel Routing Services feature prior to enabling the ports.

Refer to the *Fabric OS Administrator's Guide* for detailed instructions on configuring the Fibre Channel router ports and GbE ports on the switch.

Installing transceivers and cabling the switch

Perform the following steps to install SFP+ transceivers and cable the switch. The process for installing QSFP transceivers is similar.

1. Install the SFP transceivers in the Fibre Channel ports, as required. The ports selected for use in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Fabric OS Administrator's Guide*.

- a) Remove the plug from the port to be used.
- b) Position a transceiver so that it is oriented correctly and insert it into a port until it is firmly seated and the latching mechanism clicks.

For instructions specific to the type of transceiver, refer to the transceiver manufacturer's documentation.

NOTE

The transceivers are keyed to ensure correct orientation. If a transceiver does not install easily, ensure that it is correctly oriented.

- c) Repeat steps a and b for the remaining ports, as required.
2. Connect the cables to the transceivers.

The cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Fabric OS Administrator's Guide*.

NOTE

A 50-micron cable should not be bent to a radius less than 2 in. under full tensile load and 1.2 in. with no tensile load. Tie wraps are not recommended for optical cables because they are easily overtightened.

- a) Orient a cable connector so that the key (the ridge on one side of the connector) aligns with the slot in the transceiver. Then, insert the cable into the transceiver until the latching mechanism clicks. For instructions specific to cable type, refer to the cable manufacturer's documentation.

NOTE

The cable connectors are keyed to ensure correct orientation. If a cable does not install easily, ensure that it is correctly oriented.

- b) Repeat step a for the remaining cables as required.

Verifying correct operation and backing up the configuration

Perform the following steps to verify correct operation and back up the switch configuration.

1. Check the LEDs to verify that all components are functional. For information about LED patterns, refer to [LED activity](#) on page 31.
2. Enter the **portcfgpersistentenable** command to activate the FC ports for FC operation.
3. Verify the correct operation of the switch by entering the **switchShow** command from the workstation.

This command provides information about switch and port status.

```
sb_70:admin> switchshow
switchName:      sb_70
switchType:      148.0
switchState:     Online
switchMode:      Native
switchRole:      Subordinate
switchDomain:    70
switchId:        fffc46
switchWwn:       10:00:00:05:1e:65:79:04
zoning:          ON (PERF_CFG)
switchBeacon:    OFF
FC Router:       OFF
```

Allow XISL Use: OFF

LS Attributes: [FID: 128, Base Switch: No, Default Switch: Yes, Address Mode 0]

Index	Port	Address	Media	Speed	State	Proto	
=====							
0	0	460000	id	N16	Online	FC	F-Port 20:05:00:11:0d:a8:01:00
1	1	460100	id	N16	Online	FC	F-Port 20:01:00:11:0d:bb:01:00
2	2	460200	id	N16	Online	FC	F-Port 20:03:00:11:0d:84:01:00
3	3	460300	id	N16	Online	FC	F-Port 20:07:00:11:0d:26:01:00
4	4	460400	id	N16	Online	FC	F-Port 10:00:8c:7c:ff:5c:c5:01
5	5	460500	id	N16	Online	FC	F-Port 10:00:8c:7c:ff:58:4c:00
6	6	460600	id	N16	Online	FC	F-Port 10:00:8c:7c:ff:5c:c9:01
7	7	460700	id	N16	Online	FC	F-Port 10:00:8c:7c:ff:5c:bd:00
8	8	460800	--	N16	No_Module	FC	
9	9	460900	--	N16	No_Module	FC	
10	10	460a00	--	N16	No_Module	FC	
11	11	460b00	--	N16	No_Module	FC	
12	12	460c00	--	N16	No_Module	FC	
13	13	460d00	--	N16	No_Module	FC	
14	14	460e00	--	N16	No_Module	FC	
15	15	460f00	--	N16	No_Module	FC	
16	16	461000	--	N16	No_Module	FC	
17	17	461100	--	N16	No_Module	FC	
18	18	461200	--	N16	No_Module	FC	
19	19	461300	--	N16	No_Module	FC	
20	20	461400	--	N16	No_Module	FC	
21	21	461500	--	N16	No_Module	FC	
22	22	461600	--	N16	No_Module	FC	
23	23	461700	--	N16	No_Module	FC	
24	24	461800	--	--	Online	VE	VE-Port 10:00:00:05:1e:65:77:04 "sb_71" (upstream)
25	25	461900	--	--	Offline	VE	
26	26	461a00	--	--	Offline	VE	
27	27	461b00	--	--	Offline	VE	
28	28	461c00	--	--	Offline	VE	
29	29	461d00	--	--	Offline	VE	Disabled (10VE Mode)
30	30	461e00	--	--	Offline	VE	Disabled (10VE Mode)
31	31	461f00	--	--	Offline	VE	Disabled (10VE Mode)
32	32	462000	--	--	Offline	VE	Disabled (10VE Mode)
33	33	462100	--	--	Offline	VE	Disabled (10VE Mode)
34	34	462200	--	--	Offline	VE	
35	35	462300	--	--	Offline	VE	
36	36	462400	--	--	Offline	VE	
37	37	462500	--	--	Offline	VE	
38	38	462600	--	--	Offline	VE	
39	39	462700	--	--	Offline	VE	Disabled (10VE Mode)
40	40	462800	--	--	Offline	VE	Disabled (10VE Mode)
41	41	462900	--	--	Offline	VE	Disabled (10VE Mode)
42	42	462a00	--	--	Offline	VE	Disabled (10VE Mode)
43	43	462b00	--	--	Offline	VE	Disabled (10VE Mode)
	ge0		--	40G	Online	FCIP	
	ge1		--	40G	No_Module	FCIP	
	ge2		--	10G	No_Sync	FCIP	
	ge3		--	10G	Online	FCIP	
	ge4		--	10G	No_Module	FCIP	
	ge5		--	10G	No_Sync	FCIP	
	ge6		--	10G	Online	FCIP	
	ge7		--	10G	Online	FCIP	
	ge8		--	10G	Online	FCIP	
	ge9		--	10G	Online	FCIP	
	ge10		--	10G	Online	FCIP	
	ge11		--	10G	Online	FCIP	
	ge12		--	10G	Online	FCIP	
	ge13		--	10G	No_Module	FCIP	
	ge14		--	10G	No_Module	FCIP	
	ge15		--	10G	No_Module	FCIP	
	ge16		--	10G	Online	FCIP	
	ge17		--	10G	Online	FCIP	

4. Verify the correct operation of the switch in the fabric by entering the **fabricShow** command from the workstation.

This command provides general information about the fabric.

5. Back up the switch configuration to an FTP server by entering the **configUpload** command and following the prompts.

```
sb_70:admin> configupload
Protocol (scp, ftp, local) [ftp]:
```

```
Server Name or IP Address [host]: 192.168.0.100
User Name [user]: anonymous
Path/Filename [<home dir>/config.txt]:
Section (all|chassis|switch [all]): all
configUpload complete: All selected config parameters are uploaded
```

This command uploads the switch configuration to the server, making it available for downloading to a replacement switch if necessary.

Brocade recommends backing up the configuration on a regular basis to ensure that a complete configuration is available for downloading to a replacement switch. For specific instructions about how to back up the configuration, refer to the *Fabric OS Administrator's Guide*. The **switchShow**, **fabricShow**, and **configUpload** commands are described in detail in the *Fabric OS Command Reference*

Recommendations for cable management

Cables can be organized and managed in a variety of ways, such as by using cable channels or patch panels. Note the following recommendations:

- Plan cable management before installing the switch in a rack.
- Leave at least 1 meter (3 feet) of slack for each port cable. This provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.

NOTE

A 50-micron cable should not be bent to a radius less than 2 in. under full tensile load and 1.2 in. with no tensile load. Tie wraps are not recommended for optical cables because they are easily overtightened.

Operating the Switch

- LED activity..... 31
- Interpreting POST results.....36
- Switch maintenance..... 36
- Powering off the switch..... 37
- Removing and replacing transceivers..... 38

LED activity

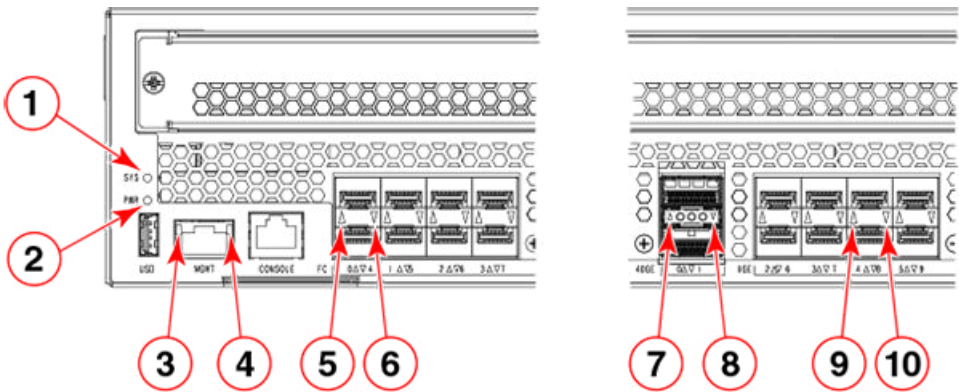
System activity and status can be determined through the activity of the LEDs on the Extension Switch.

The status LEDs may display solid amber or flash during boot, POST, or other diagnostic tests. This is normal; it does not indicate a problem unless the LEDs do not indicate a healthy state after all boot processes and diagnostic tests are complete.

LEDs on the port side of the Extension Switch

- The port side of the Extension Switch has the following LEDs:
- One system status LED
 - One power status LED
 - Management Ethernet port speed and activity LEDs
 - One port status LED for each Fibre Channel port on the Extension Switch
 - One port status LED for each optical 10/40 GbE port

FIGURE 7 LEDs on port side



1 System Status LED	6 FC Port 4 Status LED
2 System Power LED	7 40 GbE FCIP Port 0 Status LED

3 Ethernet Link LED	8 40 GbE FCIP Port 1 Status LED
4 Ethernet Status LED	9 1/10 GbE FCIP Port 4 Status LED
5 FC Port 0 Status LED	10 1/10 GbE FCIP Port 8 Status LED

The following table describes the LEDs and their actions on the port side of the Extension Switch.

TABLE 3 Port side LED patterns during normal operation

LED name	LED color	Status of hardware	Recommended action
Power Status	No light	System is off or there is an internal power supply failure.	Verify that system is powered on, the power cables attached, and your power source is live. If the system power LED is not green, the unit may be faulty. Contact your Extension Switch service provider.
	Steady green	System is on and power supplies are functioning properly.	No action required.
System Status	No light	System is off or there is no power.	Verify that system is on and has completed booting.
	Steady green	POST and initialization is completed. System is on and functioning properly.	No action required.
	Steady amber (for more than five seconds)—can take over a minute to complete POST	System is going through the power-up process.	No action required.
	Steady amber (for more than a few minutes)	Unknown state, boot failed, or the system is faulty. NOTE Once POST completes and the switch has failed, steady amber may result.	Perform the following steps: 1. Connect a serial cable to the system. 2. Reboot the system. 3. Check the failure indicated on the system console 4. Contact your Extension Switch service provider.

TABLE 3 Port side LED patterns during normal operation (Continued)

LED name	LED color	Status of hardware	Recommended action
	Flashing amber/green	Attention is required. A number of variables can cause this status, including a single power supply failure, a fan failure, or one or more environmental ranges has been exceeded.	Check the management interface and the error log for details on the cause of the status. Contact your Extension Switch service provider.
Ethernet Link	No light	There is no link.	Verify that the Ethernet cable is connected correctly.
	Steady green	There is a link.	No action required.
Ethernet Status/Activity	No light	No activity.	No action required.
	Flashing green	There is link activity (traffic).	No action required.
FC Port Status	No light	Indicates one of the following: <ul style="list-style-type: none"> No signal or light carrier (media or cable) detected. Blade may be currently initializing. Connected device is configured in an offline state. 	<ul style="list-style-type: none"> Verify the power LED is on, and check the SFP and cable. Verify the blade is not currently being initialized. Verify the status of the connected device.
	Steady green	Port is online (connected to external device) but has no traffic.	No action required.
	Slow-flashing green (on 1/2 second; then off 1/2 second)	Port is online but segmented because of a loopback cable or incompatible Extension Switch connection.	Verify that the correct device is attached to the switch.
	Fast-flashing green (on 1/4 second; then off 1/4 second)	Port is online and an internal loopback diagnostic test is running.	No action required.
	Flickering green	Port is online and frames are flowing through the port.	No action required.
	Steady amber	Port is receiving light or signal carrier, but it is not online yet.	No action required.

TABLE 3 Port side LED patterns during normal operation (Continued)

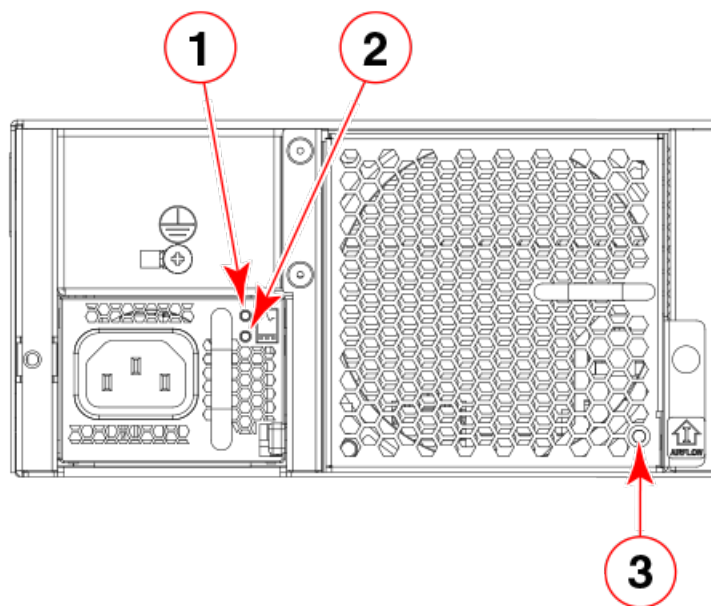
LED name	LED color	Status of hardware	Recommended action
	Slow-flashing amber (on 2 seconds; then off 2 seconds)	Port is disabled because of diagnostics or the portDisable command.	Reset the port. The portCfgPersistentDisable command is persistent across reboots.
	Fast-flashing amber (on 1/2 second; then off 1/2 second)	SFP or port is faulty.	Reset the port. Replace the SFP. Must be a Brocade-branded SFP.
10 GE/40 GE Ethernet Port Status	No light (LED is off)	Port is offline. No activity.	Verify that the power LED is on; check the transceiver and cable.
	Steady green	Port is online and active.	No action required.

LEDs on the nonport side of the switch

The nonport side of the switch has the following LEDs:

- One LED per fan FRU
- One AC LED per PSU FRU
- One DC LED per PSU FRU

Refer to [Nonport side of the switch](#) on page 14 for a diagram of the nonport side of the switch.

FIGURE 8 LEDs on nonport side

1 Power supply DC status LED

3 Fan status LED

2 Power supply AC status LED

The following table describes the LEDs and their actions on the nonport side of the Extension Switch.

TABLE 4 Nonport side LED patterns during normal operation

LED name	LED color	Status of hardware	Recommended action
Power supply AC input status (one green LED)	No light	Power supply is not receiving AC input voltage or AC input voltage is below operational limit.	Verify that the power supply is properly seated and the power cord is connected to a functioning AC power source.
	Steady green	AC input voltage is within operational range.	No action required.
Power supply DC output status (one bi-color LED)	Flashing amber (1:1)	Output voltage is not enabled.	Verify that the power supply is fully seated and that the captive screw is secured.
	Flashing amber/green (2:1)	Over temperature warning.	Verify that ambient temperature is less than 40°C (104°F) and check for intake airflow blockage.
	Flashing amber/green (1:1)	Internal fan is out of regulation.	Replace the power supply.
	Steady amber	Power supply is faulty or not plugged in completely.	Check the power cord, current, voltage, and temperature to determine the problem.
	Steady green	DC output OK.	No action required.
Fan assembly status (one bi-color LED)	No light (LED is off)	Fan assembly is not receiving power.	Verify that the fan FRU is seated correctly.
	Steady green	Fan assembly is operating normally.	No action required.
	Steady amber (for more than 5 seconds)	Fan fault for one of the following reasons: <ul style="list-style-type: none"> A fan assembly with mismatched airflow is present. One or more of the fans in the fan assembly has failed. 	Try one of the following: <ul style="list-style-type: none"> Replace the mismatched fan assembly with one that has the correct airflow direction. Replace the faulty fan assembly.

Interpreting POST results

POST is a system check that is performed each time the switch is powered on, rebooted, or reset, and during which the LEDs flash different colors.

Perform the following steps to determine whether POST completed successfully and whether any errors were detected.

1. Verify that the LEDs on the switch indicate that all components are healthy (LED patterns are described in [LEDs on the port side of the Extension Switch](#) on page 31 and [LEDs on the nonport side of the switch](#) on page 34). If one or more LEDs do not display a healthy state:
 - a) Verify that the LEDs are not set to "beacon" (this can be determined through the **switchShow** command or Web Tools). For information about how to turn beaconing on and off, refer to the *Fabric OS Administrator's Guide* or the *Web Tools Administrator's Guide*.
 - b) Follow the recommended action for the observed LED behavior, as shown in [LEDs on the port side of the Extension Switch](#) on page 31 or [LEDs on the nonport side of the switch](#) on page 34.
2. Verify the **diagShow** command displays that the diagnostic status for all ports in the switch is OK.
3. Review the system log for errors. Errors detected during POST are written to the system log, which is viewed using the **errShow** command. For more information about this command, refer to the *Fabric OS Command Reference*. For information about specific error messages, refer to the *Fabric OS Message Reference*.

Switch maintenance

The switch is designed for high availability and reliability; it does not require any regular physical maintenance. It includes diagnostic tests and field-replaceable units (FRUs).

Diagnostic tests

In addition to POST, Fabric OS includes diagnostic tests to help you troubleshoot the hardware and firmware. This includes tests of internal connections and circuitry, fixed media, and the transceivers and cables in use. The tests are implemented by command, either through a Telnet session or through a terminal set up for a serial connection to the Extension Switch. Some tests require the ports to be connected by external cables to allow diagnostics to verify the serializer/deserializer interface, transceiver, and cable. Some tests require loopback plugs.

Diagnostic tests are run at link speeds of 2-, 4-, 8-, and 16-Gbps. For information about specific diagnostic tests, refer to the *Fabric OS Administrator's Guide*.

NOTE

Diagnostic tests may temporarily lock the transmit and receive speed of the links during diagnostic testing. Brocade recommends that you power-cycle the switch after completing offline diagnostics tests.

Field-replaceable units

You can replace the power supply and fan assemblies on-site without the use of special tools. The field-replaceable units (FRUs) are keyed to ensure correct orientation during installation. Replacement instructions are provided with all FRUs ordered.



DANGER

Remove both power cords before servicing.



DANGER

Disconnect the power cord from all power sources to completely remove power from the device.

Power supplies and fans

The two PSU FRUs are hot-swappable. They are identical and fit into either bay. They are keyed to prevent being inserted upside down. Each PSU has an input rated voltage of 100-240 V and a typical Input operating range of 90-264 V. Output is 12 V which can drive up to 1100 W load.

Fabric OS identifies the power supplies as follows (viewing the switch from the nonport side):

- Power supply #1 on the right
- Power supply #2 on the left

Fabric OS identifies the fan assemblies as follows (viewing the switch from the nonport side):

- Fan assembly #1 on the right
- Fan assembly #2 in the middle
- Fan assembly #3 on the left

Any of the following methods can be used to determine whether a FRU requires replacing:

- Check the AC Status and DC Status LEDs (refer to [LEDs on the nonport side of the switch](#) on page 34). If the AC Status LED is black, verify that you are using the correct cord and power source. If the DC Status LED is black or flashing, then the FRU should be replaced. Refer to the table describing nonport side LED patterns during normal operation in [LEDs on the nonport side of the switch](#) on page 34 for information about power supply faulty states.
- In BNA, double-click the switch icon to open Web Tools, and then click the **Power Status** icon. Enter the **psShow** command at the command prompt to display power supply status.
- In BNA, double-click the switch icon to open Web Tools, then click the **Fan Status** icon. Enter the **fanShow** command at the command prompt.

Powering off the switch

Perform the following steps to power off the switch.

1. Enter the **sysShutdown** command.

This command not only shuts down the key processors but also powers off the switch and all LEDs will go dark.

2. Unplug the AC power cords.

Removing and replacing transceivers

Use the following procedure to remove and replace an SFP+ transceiver. The process for removing and replacing QSFP transceivers is the same.



DANGER

All fiber-optic interfaces use Class 1 lasers.

Time and items required

The replacement procedure for one transceiver takes less than five minutes.

You should have the following items available:

- Replacement SFP+ transceiver
- Optical transceiver extraction tool (for 8 or 10 Gbps transceiver only)

Most Brocade switches and backbones come with a transceiver extraction tool and holster. The extraction tool is designed to remove transceivers from modules where the space is limited.

FIGURE 9 Optical transceiver extraction tool



Removing an SFP+ transceiver

Complete the following steps to remove an SFP+ transceiver.

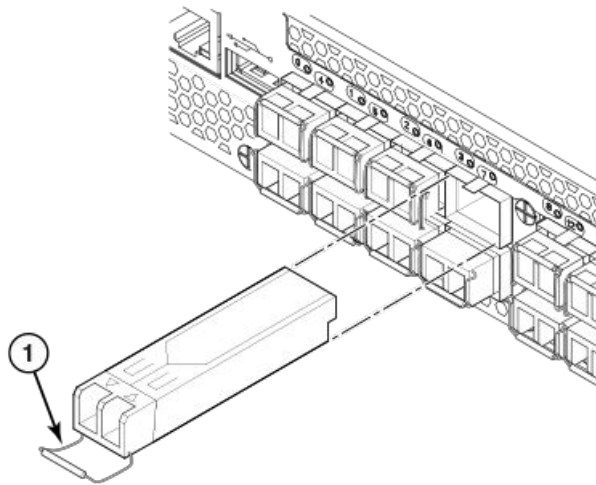
1. Remove any cables that are inserted into the transceiver. Use the extraction tool to open the cable latching mechanism.
2. Using the hooked end of the tool, pull the bail (wire handle) away from its pivot point and out, sliding the transceiver out of the switch or module.

The 16 Gbps SFP+ transceivers have an attached pull tab. Instead of using the tool, simply grasp the pull tab and pull straight out to remove the 16 Gbps SFP+ transceiver from the switch.

Replacing an SFP+ transceiver

Complete the following steps to replace an SFP+ transceiver.

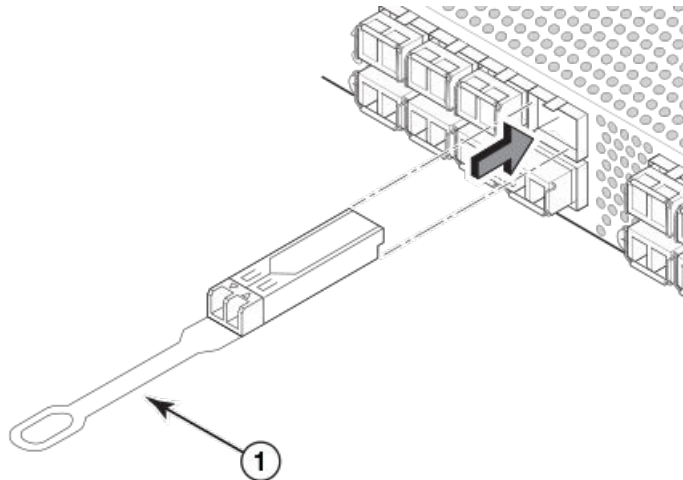
1. Making sure that the bail (wire handle) on an 8 or 10 Gbps transceiver is in the unlocked or open position, position the optical transceiver so that the key is oriented correctly to the port. Insert the transceiver into the port until it is firmly seated and the latching mechanism clicks.



1 SFP+ bail

FIGURE 10 Replacing an 8 Gbps SFP+ optical transceiver

The 16 Gbps SFP+ transceivers do not have bails. Use the pull tab on the 16 Gbps SFP+ transceivers to carefully push the transceiver into the port. Grasp the tab near the body of the transceiver to reduce the chances of bending the tab.



1 Gbps SFP+ pull tab

FIGURE 11 Replacing a 16 Gbps SFP+ optical transceiver

Transceivers are keyed so that they can only be inserted with the correct orientation. If a transceiver does not slide in easily, ensure that it is correctly oriented.

2. Position a cable so that the key (the ridge on one side of the cable connector) is aligned with the slot in the transceiver. Insert the cable into the transceiver until the latching mechanism clicks.

Cables are keyed so that they can be inserted in only one way. If a cable does not slide in easily, ensure that it is correctly oriented.

Removal and Replacement of Power Supplies and Fans

- [Removal and replacement introduction.....](#)41
- [Power supply removal and replacement.....](#)42
- [Fan removal and replacement.....](#)44

Removal and replacement introduction

NOTE

Read the [Installation and safety considerations](#) on page 19 before servicing.

The field-replaceable units (FRUs) in the switch can be removed and replaced without special tools. The switch can continue operating during the FRU replacement if the conditions specified in the procedures are followed.



DANGER

The procedures in this manual are for qualified service personnel.

Before beginning replacement

NOTE

This document describes how to change field-replaceable units (FRUs) on a Brocade 7840 switch, which has a port-side air exhaust. You must replace a failed unit with the same type of unit. This applies to both power supplies and fans. A new FRU must have the same part number (P/N) as the FRU being replaced. The manufacturing P/N is located on the top of the FRU.



CAUTION

Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with an orange arrow with an "I."

Use the external labels as a guide. Both the PSU and fan FRUs are labeled with the I airflow symbol to indicate that they takes air in.

FIGURE 12 Airflow label



The orange I symbol indicates an intake unit. This unit pulls air in from the nonport side of the switch and exhausts it out the port side. This is also called back-to-front airflow or reverse airflow. This symbol should appear on FRUs with part numbers ending with **-R**.

The **chassisShow** command indicates "reverse" airflow.

If one fan fails, the remaining fans go to high speed to maintain proper cooling until the failed fan is replaced.

If a mismatched power supply or fan is installed by mistake, a critical error message is sent to the console. The message will be similar to the following:

```
CRITICAL HIL-1611 MISMATCH in PSU/FAN Air Flow direction. Replace PSU with  
fan air flows in same direction. System will be shut down in 2 minutes.
```

Power supply removal and replacement

The switch has two power supplies. The Fabric OS identifies the power supplies from left to right on the nonport side as power supply #2 and power supply #1.

NOTE

Disassembling any part of the power supply voids the part warranty and regulatory certifications. There are no user-serviceable parts inside the power supply. Because the cooling system relies on pressurized air, do not leave either of the power supply slots empty longer than two minutes while the switch is operating. If a power supply fails, leave it in the switch until it can be replaced. Maintain both power supplies in operational condition to provide redundancy.

Refer to [LEDs on the nonport side of the switch](#) on page 34 for the power supply status LED colors, behaviors, and actions required, if any.

Determining the need to replace a power supply

Use one of the following methods to determine the status of the power supplies:

- Check the power supply AC status and DC status LEDs. Both should be green (refer to [LEDs on the nonport side of the switch](#) on page 34). If the DC status LED is amber, there is no power on the cord.
- In Web Tools, click the **Power Status** icon.
- At the command prompt, enter the **psShow** command to display power supply status:

```
sb_70:admin> psshow  
Power Supply #1 is OK  
Airflow Direction : Portside Exhaust (Reverse)  
Power Supply #2 is OK  
Airflow Direction : Portside Exhaust (Reverse)
```



DANGER

Disconnect the power cord from all power sources to completely remove power from the device.

Time and items required

Replacing a power supply in the Brocade 7840 switch should require less than two minutes to complete.

To replace a power supply in a Brocade 7840, you need a new power supply that has the same part number and airflow indicator as the power supply being replaced.

Replacing a power supply

Complete the following steps to replace a power supply in a Brocade 7840 switch.

1. To leave the Brocade 7840 in service while replacing a power supply, verify that the other power supply (the one not being replaced) has been powered on for at least four seconds and has a steady green status LED.
2. Unplug the power cord from the power supply that is being replaced.
3. Push the locking tab to the left and hold it there while using the handle on the power supply to pull it straight out and away from the chassis. Pull the power supply out slowly to avoid catching a finger on the locking tab.
4. Slide the new power supply into the chassis until the locking tab engages.

NOTE

Do not force the installation. If the power supply does not slide in easily, ensure that the power supply is correctly oriented before continuing.

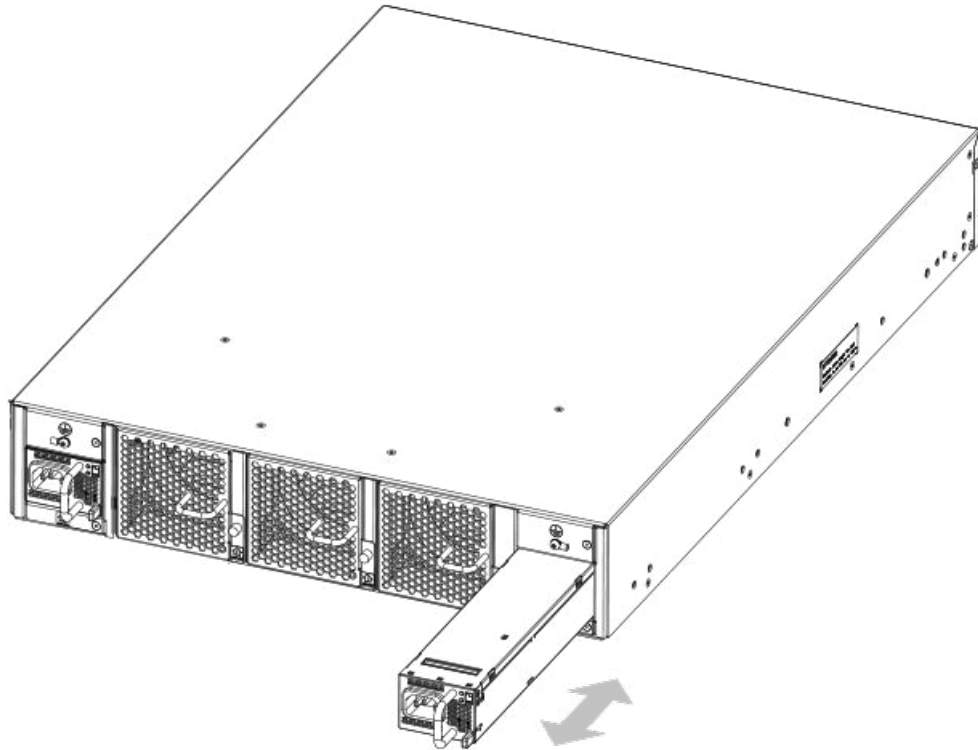
NOTE

If you observe that the switch has powered down after two minutes after a power supply replacement, it is likely because the new power supply has a mismatched airflow.

5. Plug the power cord into the power supply to power on the unit.

If the power circuit was on before the replacement, the power supply will immediately attempt to power up.

FIGURE 13 Inserting the power supply in the Brocade 7840



6. Verify that the LEDs on the new power supply display steady green while the Brocade 7840 is operating (refer to [LEDs on the nonport side of the switch](#) on page 34). If the LEDs are not steady green, ensure that the power supply is securely installed and seated properly.

Optionally, if using the command line interface (CLI), enter the **psShow** command at the command line prompt to display the status. You can also use the **chassisShow** command. The power supply status can also be viewed using the Web Tools application.

Fan removal and replacement

The Brocade 7840 has three fan FRUs. The Fabric OS identifies the fan locations from left to right as fan #3, fan #2, and fan #1.

NOTE

Disassembling any part of the fan voids the part warranty and regulatory certifications. There are no user-serviceable parts inside the fan. Because the cooling system relies on pressurized air, do not leave any of the fan slots empty longer than two minutes while the switch is operating. If a fan fails, leave it in the switch until it can be replaced. Maintain all three fans in operational condition to provide redundancy.

Refer to [LEDs on the nonport side of the switch](#) on page 34 for the power supply status LED colors, behaviors, and actions required, if any.

Determining the need to replace a fan

Use one of the following methods to determine the status of the fans:

- Check the fan status LED (refer to [LEDs on the nonport side of the switch](#) on page 34).
- In Web Tools, click the **Fan Status** icon.
- Enter the **fanShow** command at the prompt to display fan status. The output of this command shows the status of five fans. Fans 1, 2, and 3 are the FRU fans.

NOTE

Fans 4 and 5 are the integral fans of the power supplies. These two fans normally operate at around 12000 RPM while the system fans typically operate around 4000 RPM. Refer to [Power supply removal and replacement](#) on page 42 if there are any issues with those two fans.

```
sb_70:admin> fanshow
Fan 1 is Ok, speed is 4013 RPM
Fan 2 is Ok, speed is 3961 RPM
Fan 3 is Ok, speed is 3961 RPM
Fan 4 is Ok, speed is 12001 RPM
Fan 5 is Ok, speed is 11969 RPM
```

Time and items required

Replacing a fan in the Brocade 7840 should require less than two minutes to complete.

You need the following items to replace a fan in the Brocade 7840:

- A new fan that has the same part number and airflow indicator as the fan being replaced.
- A #1 Phillips screwdriver

Replacing a Brocade 7840 fan

Complete the following steps to replace a fan in a Brocade 7840.

1. Using the Phillips screwdriver, unscrew the captive screw on the fan.



DANGER

Be careful not to accidentally insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.

2. Remove the fan from the chassis by using the handle on the fan to pull it straight out and away from the chassis.
3. Install the new fan in the chassis:
 - a) Check to see that the airflow direction is the same as the fan you are replacing.
 - b) Orient the new fan with the captive screw on the right, as shown below.

NOTE

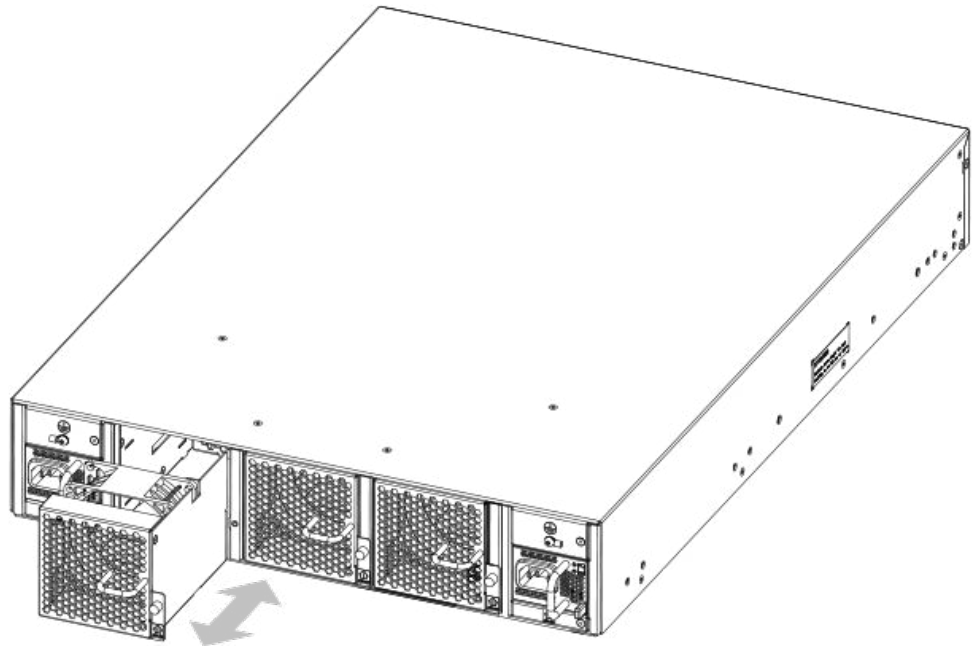
Do not force the installation. If the fan does not slide in easily, ensure that it is correctly oriented before continuing.

NOTE

If you observe that the switch has powered down after two minutes after a fan replacement, it is likely because the new fan has a mismatched airflow.

- c) Gently push the fan into the chassis until it is firmly seated.
- d) Using the Phillips screwdriver, secure the fan to the chassis by tightening the captive screw.

FIGURE 14 Inserting the fan in the Brocade 7840



- 4. Verify that the fan status LED is steady green to indicate normal operation (refer to [LEDs on the nonport side of the switch](#) on page 34).

Optionally, if using the command line interface (CLI), enter the **fanShow** command at the command line prompt to display the status. You can also use the **chassisShow** command. The fan status can also be viewed using the Web Tools application.

Brocade 7840 Technical Specifications

The Brocade 7840 Extension Switch provides Fibre Channel, FICON, and FCIP performance for remote replication, backup, and migration. Up to 24 2/4/8/16 Gbps ports Fibre Channel ports, 16 1/10 GbE, and two 40 GbE optical ports support scalable bandwidth, port density, and throughput that extend Storage Area Network (SAN) fabric connectivity over distance.

System specifications

System component	Description
Enclosure	2U chassis
System architecture	Non-blocking shared-memory Extension Switch
System processors	Quadcore (P3041) Freescale (PowerPC) processor, 1.5 GHz Cavium 6880 for frame/ packet processing Blitzer for Encryption and Compression (Xilinx Kintex-7) Condor-3 for FC Trident+ for 10/40 GE
Power supplies	Two universal AC input power supplies, one redundant (each power supply has an integral fan unit)
Fans	Three Port-Side Exhaust 11000-RPM 80mm x 80mm Fan FRUs
Cooling	Forced-air cooling (air flows from the non-port side of the Extension Switch to the port side)

Fibre channel

System component	Description
Fibre Channel ports	Twenty four 2/4/8/16 Gbps ports compatible with short wavelength (SWL), long wavelength (LWL), and extended long wavelength (ELWL) SFP+ transceivers (available wavelength options vary for 8 and 16 Gbps SFPs) and capable of auto- negotiating to maximum link speed
ANSI Fibre Channel protocol	Fibre Channel Physical and Signaling Interface standard (FC-PH)
Modes of operation	Fibre Channel Class 2 and Class 3
Fabric initialization	Complies with FC-SW-3 Rev. 6.6
FCIP (IP over Fibre Channel)	Complies with FC-IP 2.3 of FCA profile

Ethernet

System component	Description
SFP GbE ports	Sixteen 1/10 GE and two 40 GE optical/copper ports compatible with ultra short reach (USR), short reach (SR), long reach (LR), and copper SFP/SFP+ transceivers (available reach options vary from 1GbE, 10GbE and 40GbE)
Ethernet management port	One with 10/100/1000 Mbps auto-negotiating capability

LEDs

Component	Description
Switch status and management LEDs	One power One system One per FC port One per ETH port Two for Ethernet management port
Port Status LEDs	Color-changing LEDs to indicate status

Others

Component	Description
Serial Cable	One IEEE-compliant RJ-45 serial cable 10-ft (approximately 3 m) long
RJ-45 to DB9 adaptor	One
RJ-45 connector	One IEEE-compliant on the port side of the Extension Switch for use with a serial console and 10/100 Mbps Ethernet +

Weight and physical dimensions

The Brocade 7840 includes all the fans and PSU FRUs, but not the transceivers or cables.

Model	Height	Width	Depth	Weight
Brocade 7840	8.6 cm	44.0 cm	60.9 cm	18.23 kg
	3.39 in	17.32 in	24.00 in	40.2 lb

Environmental requirements

Condition	Operational	Non-operational
Ambient temperature	0°C to 40°C 32°F to 104°F	-25°C to 70°C -13°F to 158°F
Relative humidity (non-condensing)	5% to 93% at 40°C (104°F)	10% to 95% at 70°C (158°F)
Altitude (above sea level)	0 to 3000 m 0 to 9,842 feet	0 to 12,000 m 0 to 39,370 feet
Shock	20 G, 11 ms, half-sine wave	20 G, 11 ms, half-sine wave, 3/eg axis
Vibration	1.0 G sine, 0.5 Grms random, 5-500 Hz	2.4 G sine, 1.1 Grms random, 5-500 Hz
Air flow	Maximum: 347 cmh (204 cfm)	N/A
Operating noise	48.0 dBA	N/A

Power supply specifications (per PSU)

Power supply model	Maximum output power rating (DC)	Input voltage	Input line frequency	Maximum input current	Input line protection	Maximum inrush current
XBR-1100WP SAC-R	1100 W	100 - 240 V (nominal) 90 - 264 V (range)	50 - 60 Hz (nominal)	12-5 A	Line Fused	40 A peak for any initial current surge at cold or warm start

Power consumption (typical configuration)

The Brocade 7840 does not support a DC power supply.

Model name	@100 VAC input	@200 VAC input	@-48 VDC input	Minimum number of power supplies	Notes
Brocade 7840	3.90 A 388 W 1524 BTU/hr	1.98 A 383 W 1307 BTU/hr	N/A	2 x AC 1100 W	SR Optics, fans at nominal speed, 2PSUs

Model name	@100 VAC input	@200 VAC input	@-48 VDC input	Minimum number of power supplies	Notes
Brocade 7840	4.24 A 422 W 1440 BTU/Hr	2.19 A 423 W 1444 BTU/Hr	N/A	2 x AC 1100 W	LR Optics, fans at nominal speed, 2 PSUs

Power consumption (maximum configuration)

Model name	@100 VAC input	@200 VAC input	Minimum number of power supplies	Notes
Brocade 7840	4.56 A 454 W 1550 BTU/hr	2.34 A 452 W 1536 BTU/hr	2 x AC 1100 W	SR Optics, fans at high speed, 2PSUs
Brocade 7840	4.94 A 492 W 1679 BTU/Hr	2.54 A 490 W 1672 BTU/Hr	2 x AC 1100 W	LR Optics, fans at high speed, 2 PSUs

Data port specifications (Ethernet)

Model	Port Type	Number of ports	Description
Brocade 7840	40 GbE	2	Compatible with short range (SR) and long range (LR) optical QSFP+ transceivers
Brocade 7840	10 GbE	16	Compatible with ultra short reach (USR), short reach (SR) and long reach (LR) optical SFP+ transceivers
Brocade 7840	1 GbE	16	Compatible with -SX, -LX, and -CX(copper) SFP transceivers

Fibre Channel data transmission range specifications

Port speed (Gbps)	Cable size (microns)	Short wavelength (SWL)	Long wavelength (LWL)	Extended long wavelength (ELWL)
2	50	300 m (984 ft) (OM2) 500 m (1,640 ft) (OM3)	N/A	N/A

Port speed (Gbps)	Cable size (microns)	Short wavelength (SWL)	Long wavelength (LWL)	Extended long wavelength (ELWL)
4	62.5	150 m (492 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	80 km (50 miles)
	50	150 m (492 ft) (OM2) 380 m (1,246 ft) (OM3)	N/A	N/A
	62.5	70 m (230 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
8	50	50 m (164 ft) (OM2) 150 m (492 ft) (OM3)	N/A	N/A
	62.5	21 m (69 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
16	50	N/A	N/A	N/A
	62.5	21 m (69 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A

Serial port specifications (pinout RJ-45)

Pin	Signal	Description
1	Not supported	NA
2	Not supported	NA
3	UART1_TXD	Transmit data
4	GND	Logic ground
5	GND	Logic ground
6	UART1_RXD	Receive data
7	Not supported	NA
8	Not supported	NA

Serial port specifications (protocol)

Parameter	Value
Baud	9600
Data bits	8
Parity	No
Flow control	None

Memory specifications

Memory	Type	Size
Boot	Flash	4 MB
Compact Flash	USB	8 GB
Control Plane	DDR3 RDIMM SDRAM	8 GB
Data Plane	DDR3 RDIMM SDRAM	128 GB

Regulatory compliance (EMC)

- FCC Title 47 CFR, Part 15 Subpart B: Class A
- ICES-003 (Canada) Class A
- VCCI (Japan) Class A
- AS/NZS CISPR 22 (Australia/New Zealand) Class A
- BSMI CNS13438
- EN 55022 Class A
- EN 300 386 V1.6.1
- EN 55024

Regulatory compliance (safety)

- IEC 60950-1
- CAN/CSA-C22.2 No 60950-1-07, Incl. AM1
- ANSI/UL Std No 60950-1, 2nd, Ed. Incl. AM1
- EN 60950-1
- EK1 - ITB 2000
- ZEK 01.4-08/11.11

Regulatory compliance (environment)

- Refer to the latest revision of the China RoHS document (PN 53-1000428-xx) which ships with the product.

Regulatory Statements

- BSMI statement (Taiwan).....55
- Canadian requirements.....55
- CE Statement.....55
- China CC statement.....56
- FCC warning (US only).....56
- Germany.....57
- KCC statement (Republic of Korea).....57
- VCCI statement.....57

BSMI statement (Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，
在這種情況下，使用者會被要求採取某些適當的對策。

Warning:
This is Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Canadian requirements

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations, ICES-003 Class A.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CE Statement

ATTENTION
This is a Class A product. In a domestic environment, this product might cause radio interference, and the user might be required to take corrective measures.

The standards compliance label on this device contains the CE mark which indicates that this system conforms to the provisions of the following European Council directives, laws, and standards:

- Electromagnetic Compatibility (EMC) Directive 2004/108/EEC
- Low Voltage Directive (LVD) 2006/95/EC
- EN50082-2/EN55024:1998 (European Immunity Requirements)

- EN61000-3-2/JEIDA (European and Japanese Harmonics Spec)
- EN61000-3-3

China CC statement



China-CCC Warning statements

在维修的时候一定要断开所有电源 (English translation "disconnect all power sources before service")



For non tropical use:

安全 说明 和标 记	汉文	“仅适用于非热带气候条件下安全使用。”
	藏文	(འགྲོ་བུ་རྒྱལ་ སྤྱི་མཐུན་ རྟེན་སྡེ་གླིང་གི་ རྩིས་ཀྱི་ རྟེན་སྡེ་གླིང་གི་ རྩིས་ཀྱི་ རྟེན་སྡེ་གླིང་)
	蒙古文	“ <i>“ဆံပင်/ရေ/သွေး/အား/ခံနိုင်စွမ်း/မရှိသော/ဥပဒေ/အောက်/၌/အသုံးပြု/ရန်/မဖြစ်နိုင်ပါ။”</i>
	壮文	Dan hab yungh youq gij dienheiq diuzgen mbouj dwg diegndat haenx ancienz sawjyungl.
	维文	غەبىرى ئۇسۇق بەلباغ ھاۋا كىلىماتى شاراائىتىدىلا بىخەتەر ئىشلەتكىلى بولىدۇ



For altitude 2000 meter and below:

	汉文	仅适用于海拔2000m以下地区安全使用。
	藏文	(2000m རྩ་ལོགས་ནི་མཐོང་བར་དེ་ཙམ་གྱི་འཇུག་པར་བྲལ།)
安全说明和标记	蒙古文	“Бүх хэдгэвч анхан зах зогсоо 2000м-ийн дунд байрладаггүйг үндсэндээ заргаар тодорхойлж байна.”
	壮文	Dan hab yungh youq gij digih haijbaz 2000m doxroengz haenz ancienz sawjyung.
	维文	دېڭىز يۈزىدىن 2000 مېتر تۆۋەن رايونلاردا بىخەتەر ئىشلەتكىلى بولىدۇ

Warning for Class A:

声明

此为 A 级产品, 在生活环境中, 该产品可能会造成无线电干扰。在这种情况下, 可能需要用户对其干扰采取切实可行的措施。

English translation of above statement

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC warning (US only)

This equipment has been tested and complies with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Germany

Machine noise information regulation - 3. GPSGV, the highest sound pressure level value is 79.0 dB(A) in accordance with EN ISO 7779.

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 79.0 dB(A) gemäss EN ISO 7779.

KCC statement (Republic of Korea)

A급 기기 (업무용 방송통신기기): 이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Class A device (Broadcasting Communication Device for Office Use): This device obtained EMC registration for office use (Class A), and may be used in places other than home. Sellers and/or users need to take note of this.

VCCI statement

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance might arise. When such trouble occurs, the user might be required to take corrective actions.

Cautions and Danger Notices

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Cautions

A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

Ein Vorsichtinweis warnt Sie vor potenziellen Personengefahren oder Beschädigung der Hardware, Firmware, Software oder auch vor einem möglichen Datenverlust

Un message de mise en garde vous alerte sur des situations pouvant présenter un risque potentiel de dommages corporels ou de dommages matériels, logiciels ou de perte de données.

Un mensaje de precaución le alerta de situaciones que pueden resultar peligrosas para usted o causar daños en el hardware, el firmware, el software o los datos.

General cautions



CAUTION

Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

VORSICHT	Falls dieses Gerät verändert oder modifiziert wird, ohne die ausdrückliche Genehmigung der für die Einhaltung der Anforderungen verantwortlichen Partei einzuholen, kann dem Benutzer der weitere Betrieb des Gerätes untersagt werden.
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MISE EN GARDE	Les éventuelles modifications apportées à cet équipement sans avoir été expressément approuvées par la partie responsable d'en évaluer la conformité sont susceptibles d'annuler le droit de l'utilisateur à utiliser cet équipement.
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PRECAUCIÓN	Si se realizan cambios o modificaciones en este dispositivo sin la autorización expresa de la parte responsable del cumplimiento de las normas, la licencia del usuario para operar este equipo puede quedar anulada.
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CAUTION

Do not install the device in an environment where the operating ambient temperature might exceed 40°C (104°F).

VORSICHT	Das Gerät darf nicht in einer Umgebung mit einer Umgebungsbetriebstemperatur von über 40°C (104°F) installiert werden.
----------	--

MISE EN GARDE	N'installez pas le dispositif dans un environnement où la température d'exploitation ambiante risque de dépasser 40°C (104°F).
PRECAUCIÓN	No instale el instrumento en un entorno en el que la temperatura ambiente de operación pueda exceder los 40°C (104°F).



CAUTION

Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with an orange arrow with an "I."

VORSICHT	Vergewissern Sie sich, dass die Luftstromrichtung des Netzteils der eingebauten Lüftereinheit entspricht. Die Netzteile und Lüftereinheiten sind eindeutig mit einem orangefarbenen Pfeil mit dem Buchstaben "I" gekennzeichnet.
MISE EN GARDE	Veillez à ce que le sens de circulation de l'air du bloc d'alimentation corresponde à celui du tiroir de ventilation installé. Les blocs d'alimentation et les tiroirs de ventilation sont étiquetés d'une flèche orange avec un "I".
PRECAUCIÓN	Asegúrese de que la dirección del flujo de aire de la unidad de alimentación se corresponda con la de la bandeja del ventilador instalada. Los dispositivos de alimentación y las bandejas del ventilador están etiquetadas claramente con una flecha naranja y una "I".



CAUTION

Make sure the airflow around the front, sides, and back of the device is not restricted.

VORSICHT	Stellen Sie sicher, dass an der Vorderseite, den Seiten und an der Rückseite der Luftstrom nicht behindert wird.
MISE EN GARDE	Vérifiez que rien ne restreint la circulation d'air devant, derrière et sur les côtés du dispositif et qu'elle peut se faire librement.
PRECAUCIÓN	Asegúrese de que el flujo de aire en las inmediaciones de las partes anterior, laterales y posterior del instrumento no esté restringido.

Electrical cautions



CAUTION

Before plugging a cable into to any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

VORSICHT	Bevor Sie ein Kabel in einen Anschluss einstecken, entladen Sie jegliche im Kabel vorhandene elektrische Spannung, indem Sie mit den elektrischen Kontakten eine geerdete Oberfläche berühren.
MISE EN GARDE	Avant de brancher un câble à un port, assurez-vous de décharger la tension du câble en reliant les contacts électriques à la terre.

PRECAUCIÓN Antes de conectar un cable en cualquier puerto, asegúrese de descargar la tensión acumulada en el cable tocando la superficie de conexión a tierra con los contactos eléctricos.

Danger Notices

A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Ein Gefahrenhinweis warnt vor Bedingungen oder Situationen die tödlich sein können oder Sie extrem gefährden können. Sicherheitsetiketten sind direkt auf den jeweiligen Produkten angebracht um vor diesen Bedingungen und Situationen zu warnen.

Un paragraphe Danger indique des conditions ou des situations potentiellement mortelles ou extrêmement dangereuses. Des labels de sécurité sont posés directement sur le produit et vous avertissent de ces conditions ou situations

Una advertencia de peligro indica condiciones o situaciones que pueden resultar potencialmente letales o extremadamente peligrosas. También habrá etiquetas de seguridad pegadas directamente sobre los productos para advertir de estas condiciones o situaciones.

General dangers



DANGER

The procedures in this manual are for qualified service personnel.

GEFAHR	Die Vorgehensweisen in diesem Handbuch sind für qualifiziertes Servicepersonal bestimmt.
--------	--

DANGER	Les procédures décrites dans ce manuel doivent être effectuées par un personnel de maintenance qualifié.
--------	--

PELIGRO	Los procedimientos de este manual deben llevarlos a cabo técnicos cualificados.
---------	---



DANGER

Be careful not to accidentally insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.

GEFAHR	Die Finger dürfen nicht versehentlich in das Ventilatorblech gesteckt werden, wenn dieses vom Gehäuse abgenommen wird. Der Ventilator kann sich unter Umständen noch mit hoher Geschwindigkeit drehen.
--------	--

DANGER	Faites attention de ne pas accidentellement insérer vos doigts dans le boîtier du ventilateur lorsque vous l'enlevez du châssis. Il est possible que le ventilateur tourne encore à grande vitesse
--------	--

PELIGRO	Procure no insertar los dedos accidentalmente en la bandeja del ventilador cuando esté desmontando el chasis. El ventilador podría estar girando a gran velocidad.
---------	--

Electrical dangers



DANGER

Remove both power cords before servicing.

GEFAHR Trennen Sie beide Netzkabel, bevor Sie Wartungsarbeiten durchführen.

DANGER Retirez les deux cordons d'alimentation avant toute maintenance.

PELIGRO Desconecte ambos cables de alimentación antes de realizar reparaciones.



DANGER

Disconnect the power cord from all power sources to completely remove power from the device.

GEFAHR Ziehen Sie das Stromkabel aus allen Stromquellen, um sicherzustellen, dass dem Gerät kein Strom zugeführt wird.

DANGER Débranchez le cordon d'alimentation de toutes les sources d'alimentation pour couper complètement l'alimentation du dispositif.

PELIGRO Para desconectar completamente la corriente del instrumento, desconecte el cordón de corriente de todas las fuentes de corriente.



DANGER

Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

GEFAHR Stellen Sie sicher, dass die Stromkreise ordnungsgemäß geerdet sind. Benutzen Sie dann das mit dem Gerät gelieferte Stromkabel, um es an die Stromquelle anzuschließen.

DANGER Vérifiez que les circuits de sources d'alimentation sont bien mis à la terre, puis utilisez le cordon d'alimentation fourni avec le dispositif pour le connecter à la source d'alimentation.

PELIGRO Verifique que circuitos de la fuente de corriente están conectados a tierra correctamente; luego use el cordón de potencia suministrado con el instrumento para conectarlo a la fuente de corriente

Dangers related to equipment weight



DANGER

Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

GEFAHR	Stellen Sie sicher, dass das Gestell für die Unterbringung des Geräts auf angemessene Weise gesichert ist, so dass das Gestell oder der Schrank nicht wackeln oder umfallen kann.
DANGER	Vérifiez que le bâti abritant le dispositif est bien fixé afin qu'il ne devienne pas instable ou qu'il ne risque pas de tomber.
PELIGRO	Verifique que el bastidor que alberga el instrumento está asegurado correctamente para evitar que pueda hacerse inestable o que caiga.

Laser dangers



DANGER

All fiber-optic interfaces use Class 1 lasers.

GEFAHR	Alle Glasfaser-Schnittstellen verwenden Laser der Klasse 1.
DANGER	Toutes les interfaces en fibres optiques utilisent des lasers de classe 1.
PELIGRO	Todas las interfaces de fibra óptica utilizan láser de clase 1.

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